



ICFA-ICUIL common interests and activities

**ICFA Meeting, Hamburg,
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Status: ICFA – ICUIL liaison

ICUIL: International Committee on Ultra-High Intensity Lasers

Information on relevant ICUIL activities

- *Roadmap to laser-based light sources and particle accelerators (first thoughts)*
- *Laser ion acceleration and potential applications*
- *European „Extreme Light Infrastructure“ ELI*
- *Strategic alliances on the national and regional level*

Proposal for Joint ICFA/ICUIL “Task Force“



Status: ICFA – ICUIL liaison



- A) ICFA endorsed initiation of joint efforts on February 13, 2009, upon presentation by Toshiki Tajima (ICUIL Chair)**
- B) Wim Leemans (ICUIL/ICFA): Presentation before ICFA Panel on Advanced and Novel Accelerators (May 5)**
 - 1) Joint workshop on laser technology for future colliders
 - 2) Survey of the requirements for laser based light and particle sources .
 - 3) Identify future laser system requirements and key technological bottlenecks
 - 4) Visions for technology paths (Technical report)
- C) Today: Proposal for Joint “Task Force” between:**
 - ICFA Panel on Beam Dynamics
 - ICFA Panel on Advanced and Novel Accelerators
 - ICUIL Sub-Group on Laser Acceleration



International Committee on Ultra-High Intensity Lasers

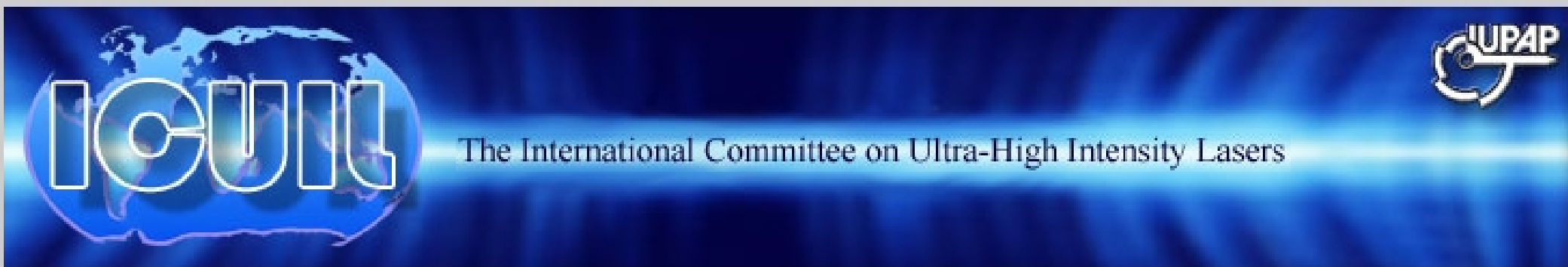


*An IUPAP
Working Group*

Mission and Objectives

The International Committee on Ultra-High Intensity Lasers (ICUIL) is an organization actively concerned with the growth and vitality of the whole international field of ultra-high intensity laser science, technology and education.

"Ultra-high intensity" is understood as a dynamic quantity representing the top development level of the relevant laser technology at any given time.



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About ICUIL

Objectives

The International Committee on Ultra-High Intensity Lasers (ICUIL) is an organization concerned with international aspects of ultra-high intensity laser science, technology and education.

[History](#)

[Charter](#)

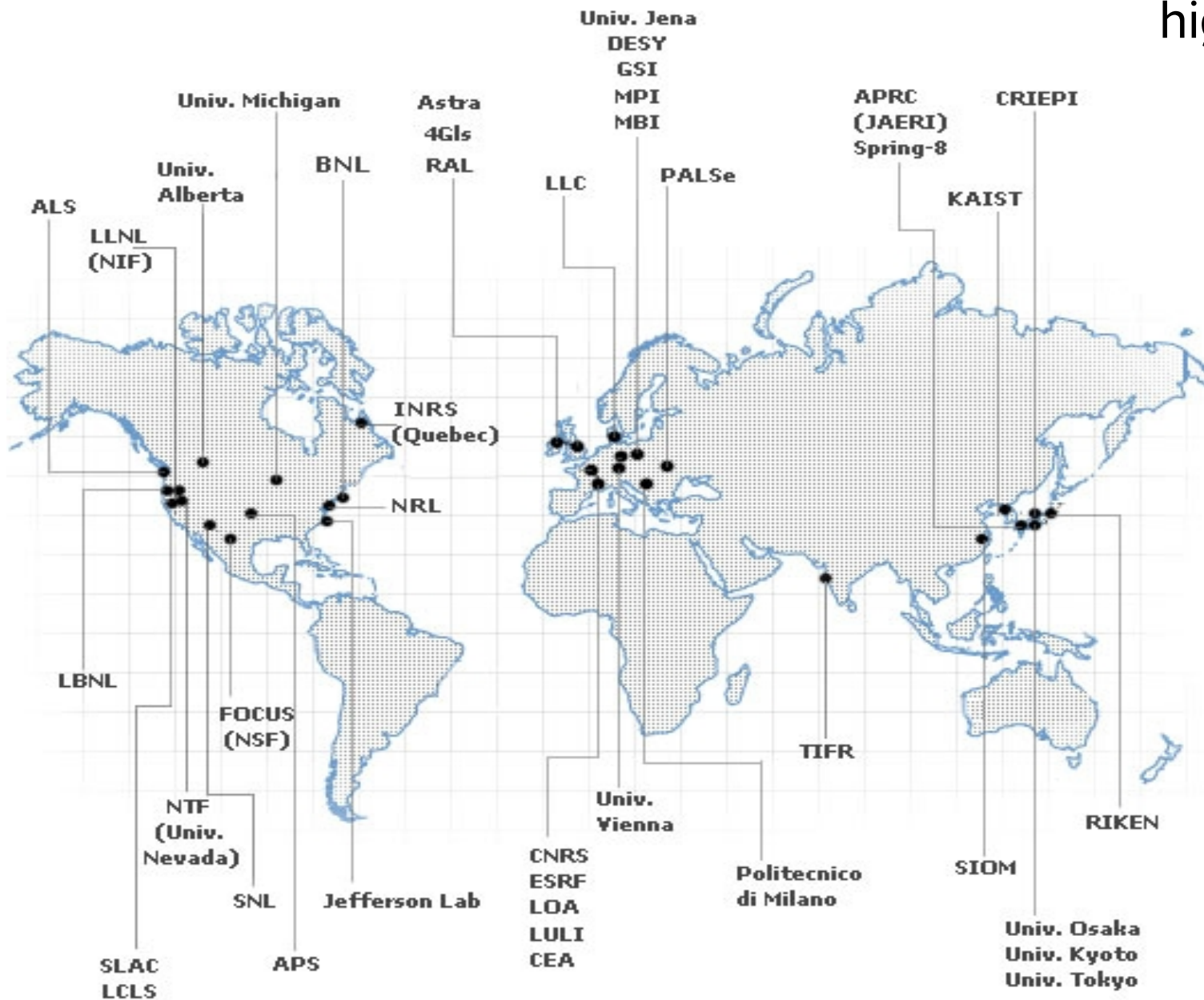
[Committee](#)

The objectives of ICUIL



- ☐ To provide a venue for discussions among representatives of high-intensity laser facilities and members of user communities, on international collaborative activities such as the development of the next generation of ultrahigh intensity lasers, exploration of new areas of fundamental and applied research, and formation of a global research network for access to advanced facilities by users.
- ☐ To promote unity and coherence in the field by convening conferences and workshops dedicated to ultrahigh intensity lasers and their applications.
- ☐ To accelerate progress in the field by sharing information, exploring opportunities for joint procurement, and exchanging equipment, ideas and personnel among laser laboratories world-wide.
- ☐ To attract students to high-field science by promoting their education and training, their interactions with prominent scientists, and access to the latest equipment, results and techniques.
- ☐ To strengthen and exploit synergy with other relevant fields and techniques, notably accelerator-based free electron lasers.

The world of high power lasers



www.icuil.org



Information on relevant ICUIL activities:

a) ***Roadmap to laser-based light sources and particle accelerators (first thoughts):***

- Key issues:

- a) underlying physics: efficient conversion of laser energy into photon and particle energy

- b) technology issues:

- *laser peak power* to make the process work;
 - *laser average power* to make it useful and competitive

- *Collider applications appear most demanding TeV scale collider as vision model?*



Information on relevant ICUIL activities II:

b) Laser ion acceleration and potential applications

- *Centres for laser based tumor therapy to be created (e.g. Munich&Dresden); collaborative effort on basic research exists in various countries*
- *Active research on efficient acceleration mechanisms:
>10% conversion efficiency w. DLC foils (MBI/Munich)
30 MeV C ions @ 40% energy spread (MBI/Munich)
30-40 MeV protons @ 30% energy spread (LANL)*
- *Extrapolation to 200MeV ions @ sufficient beam quality is conceivable; physics, technology and medical issues are under investigation*



Information on relevant ICUIL activities IV:

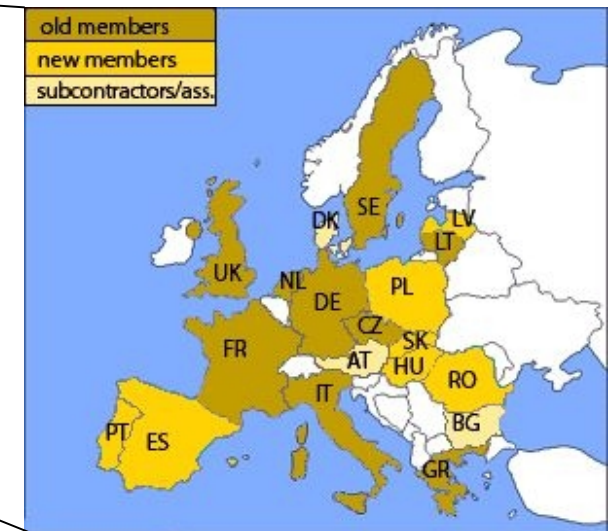
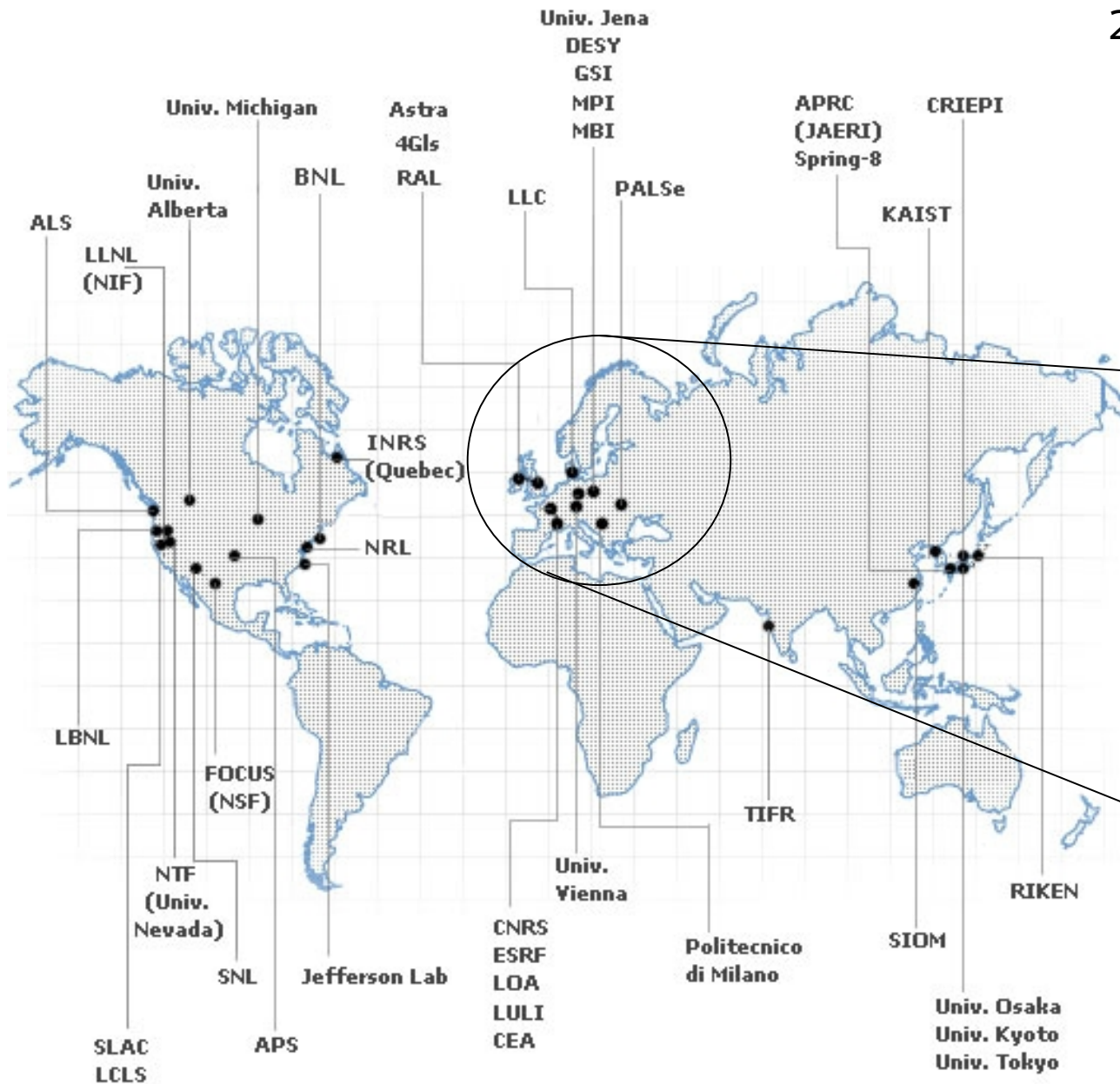
c) Strategic alliances:

Much like ICFA-ICUIL on a global level, national laboratories or regional networks are forming strategic alliances

Examples (non exhaustive):

- “*Next Light Source*” (UK): *liaison of accelerator- and laser-community for next generation user facility*
- “*Helmholtz/Leibniz/MPG Alliance*” (DE) *proposed alliance between national laboratories GSI, DESY, HZB, FZD, MBI, and MPQ*
- *SLAC, Berkeley, LLNL (USA)....*
- *Alliance between European Networks:*
LASERLAB-EUROPE <=> Accelerator-I3)

www.laserlab-europe.eu
 „Integrated Activity“ (I3)
 26 Laboratories/ 16 EU countries



Relevant JRAs:

HAPPIE: High Average and Peak Power Technology

LAPTECH: Laser plasma accelerator activity



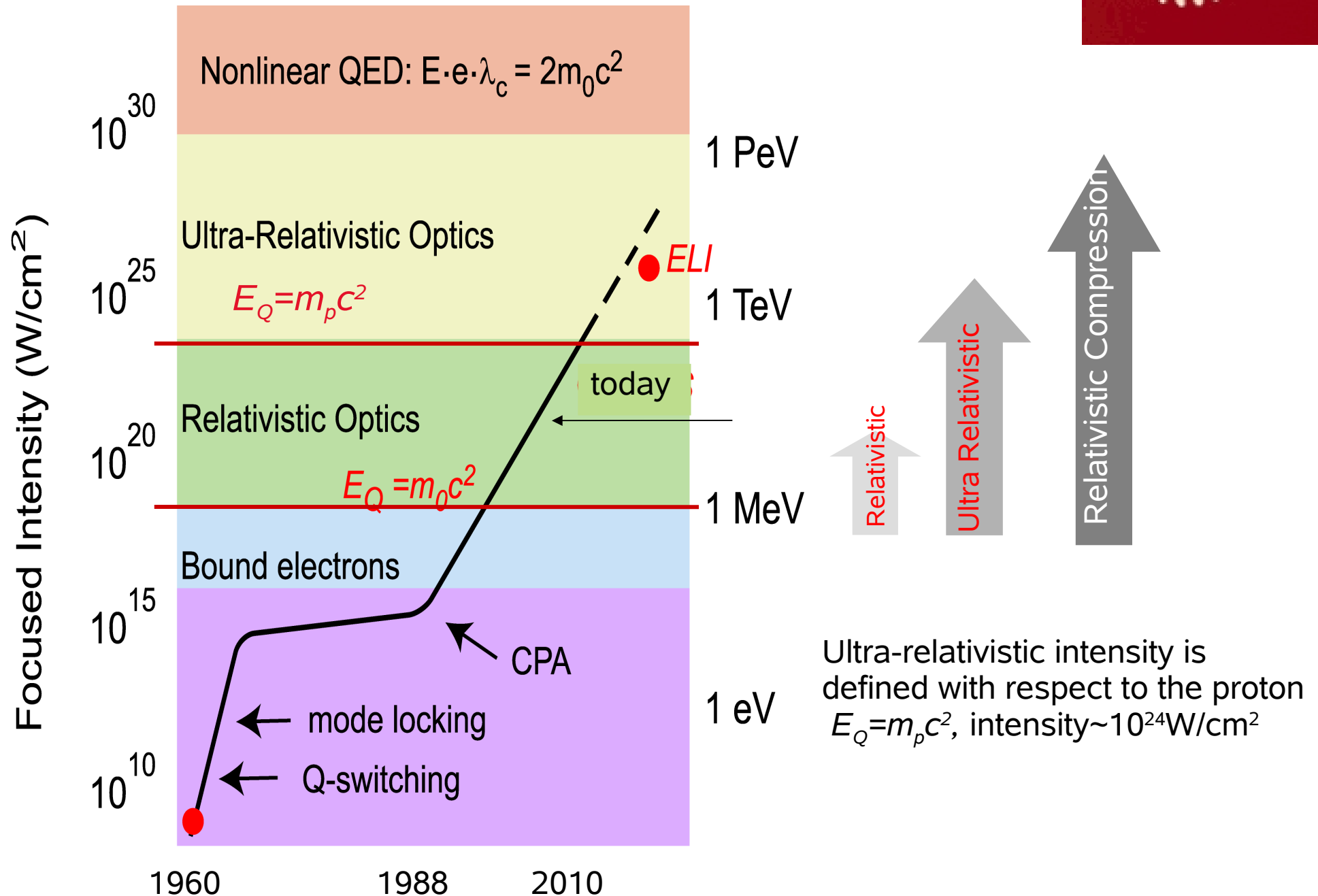
Information on relevant ICUIL activities III:

d) „*Extreme Light Infrastructure*“ ELI:

The first truly international laser facility project; with special emphasis on *laser acceleration*, vacuum physics, attosecond science, and photonuclear science (~2015)

- *ELI will be a major step forward towards the solutions necessary for laser-based accelerators: plasma acceleration physics at highest intensities, laser peak power, and laser average power*
- *ELI SAB: “In the next few years many PW-class systems will be used for demonstrating 10 GeV modules, ELI’s focus should be on demonstration of acceleration to 100 GeV.”*
- *ELI investigates scenarios that may form the foundation toward a TeV collider based on laser acceleration*

A European Extreme Light Infrastructure





The time seems right for the next step:



Joint „Task Force“



A Proposal to ICFA, put forward by:

- ICFA Panel on Beam Dynamics (Weiren Chou)
- ICFA Panel on Advanced and Novel Accelerators (Mitsuru Uesaka)
- ICUIL Sub-Group on Laser Acceleration (W. Leemans, represented by W. Sandner (ICUIL Vice Chair))

Mission:

“To promote and encourage international collaboration between accelerator and laser communities for future applications of particle acceleration“



Task force activities (draft)



- 1) Invitation list from each community
- 2) Joint strategy workshop on laser technology for future colliders to decide next steps
=> **planning underway: April 2010(?)**
- 3) Potential next steps:
 - Survey of the requirements for laser based light and particle sources (e.g. TeV class collider)
 - Identify bottlenecks and solutions in laser acceleration physics
 - Identify bottlenecks and solutions in laser technology
 - Draft visions & roadmap
 - **Most Importantly: provide a global platform for inter-community activities and communications**